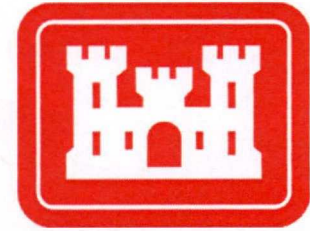




# ***JBLM PFOS/PFOA PA/SI***



## **Technical Project Planning Meeting #1**



**6 December 2017**

USEPA SF

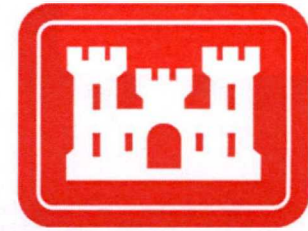


1531104



# Agenda

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Introductions

Problem

Meeting Objectives

Proposed Overall Approach

Potential PFOS/PFOA Source Identification/Assessment Scope

- Break -

Analyte List

Existing Data Review

Data Gaps

Potential Source Prioritization Criteria

Potential Phase I Sampling Locations

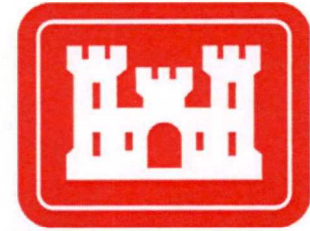
Current Schedule

Open Discussion on Path Forward



# *Introductions*

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## **JBLM**

Meseret Ghebreslassie - IR Program Manager DPW Environmental Division IMLM-PWE

Alexander Guerrero

John Gilkinson

Cecil Ramsey

Cynthia Trout

Lyle Fogg

Matthew Lambiotte

Michael Grenko

Paul Steucke

## **Army Environmental Command**

Dave Mays

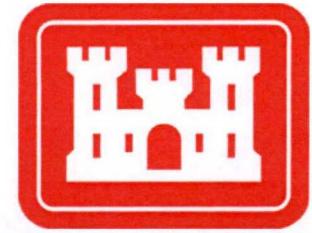
Martin Robert





# ***Introductions***

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## **USACE**

William Graney - Program Manager for Army & AF EQ and IRP Seattle District USACE

Jason Osborne – Remedial Biologist

Phil Gardener – Risk Toxicologist

## **U.S. EPA Region X**

Chris Cora – Project Manager

Ted Repasky – Hydrogeologist

## **Washington State Department of Ecology**

Chuck Hoffman – Project Manager

## **AECOM**

Anthony Palmieri – AECOM Deputy Project Manager/Geologist

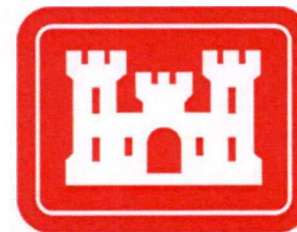
Al Thatcher – Source Assessment

Greg Burgess – AECOM Project Manager





# Problem

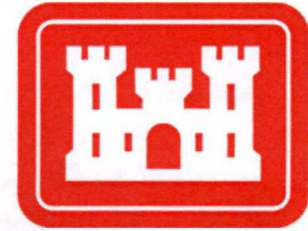


PFOS and PFOA detections above the EPA Lifetime Health Advisory (LHA) of 70 parts per trillion in six production wells and at lesser concentrations in other production wells on the installation.





# *Meeting Objectives*



**Meeting is intended to be interactive, please speak up with thoughts, ideas, and questions at any time**

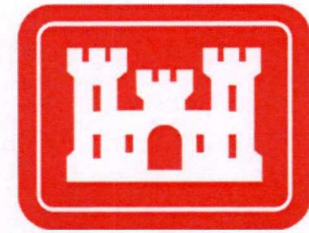
1. Present/discuss overall approach
2. Present/discuss PFOS/PFOA source identification/assessment scope
3. Develop consensus on source area prioritization criteria
4. Develop consensus on analyte list
5. Provide stakeholders an overview of existing data
6. Develop consensus on Phase I sampling locations





# ***Proposed Approach***

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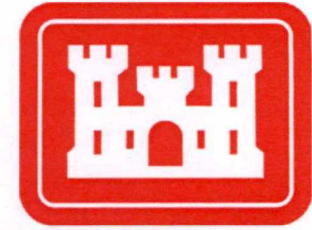
1. Review existing data
2. Potential PFOS/PFOA source identification/assessment
3. Prioritize source areas
4. TPP #2 – to select Phase I sampling locations
  - Existing wells
  - OU 1 LF-2 P&T System Influent and Effluent
  - OU 1 I-5 P&T System Influent and Effluent
  - OU 1 Sea Level Aquifer P&T System Influent and Effluent
  - OU 3 ALGT source area wells
5. Finalize list for Phase I sample locations
6. QAPP review and finalization
7. Conduct Phase I sampling
8. Conduct lab analysis





# ***Proposed Approach***

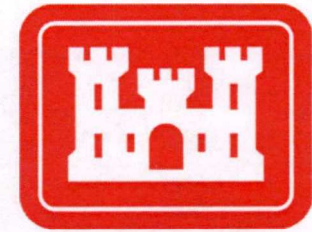
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9. TPP #3
  - Review tabular summary of Phase I (tables and maps)
  - Identify supplemental well installation locations
10. QAPP Addendum #1 – Well Installation and Phase II sampling locations (tables and maps)
11. Install supplemental wells
12. Identify monitoring wells for Phase II sample collection and analysis
13. Conduct Phase II sample collection and analysis
14. TPP #4 – Review tabular summary of results
15. Report all results with project team review prior to finalization



# ***PA - Source Identification***



## **Primary Objectives**

1. Identify operations/activities, both current historic, of potential concern for contributions of PFOS/PFOA
2. Identify potential pathways to the environment
3. Prioritize potential source areas for Site Investigation

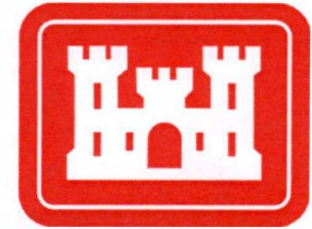
Focus on AFFF storage and use (e.g. fire-fighting training areas, crash/accident sites, accidental system releases or spills). Based on experience, other products/activities of concern include:

- Landfills
- Surfactant operations (e.g. vehicle wash, WWTPs, vehicle repair (e.g. engine cleaning detergents))
- Lubricants
- Dry wells (stormwater)



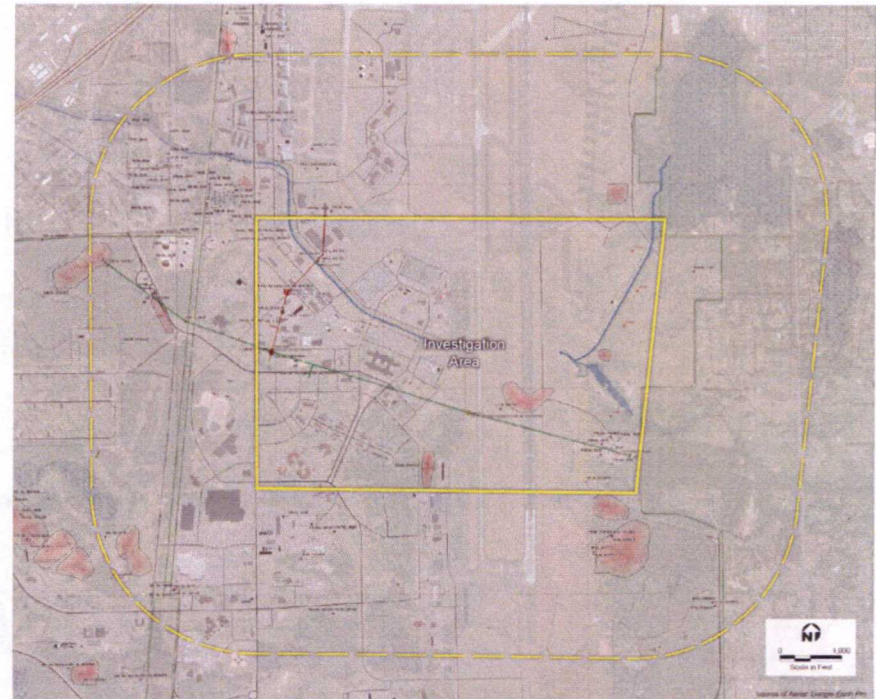


# PA - Source Identification



## Screening For Operations & Areas of Concern

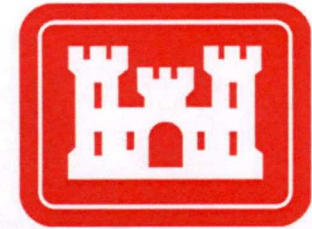
- Possibly obtain government database review reports (sub: EDR Environmental – Radius Map Report [RMR]) for select areas:
  - Focus areas centered on obvious higher activity
  - Areas with identified concerns based on map review
- Review RMR for activities/locations of concern:
  - Fire training
  - Spills
  - Dry wells (stormwater)
  - Known contaminated sites







# PA - Source Identification



**Interview JBLM staff (including but not limited to):**

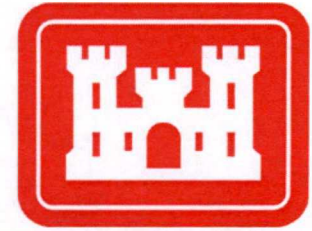
- Environmental
- Historians
- Fire Chief
- Individuals with knowledge of past crashes or accidents with fire fighting requirement
- Procurement Staff
- Public Works
- Others identified by the project team





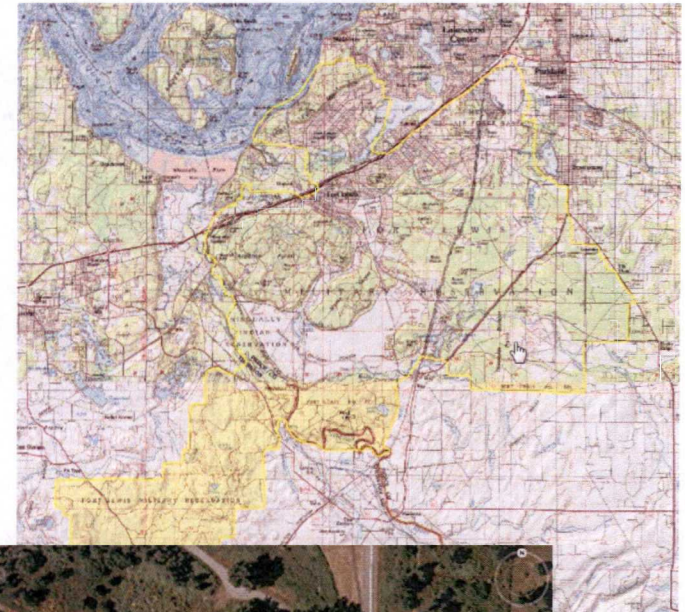


# PA - Source Identification



## Review Historical Resources

- Topographic maps
- Storm Water Pollution Prevention Plans
- NPDES Permits as applicable
- Waste Disposal Manifests
- Other sources identified by the project team
- Aerials



1990

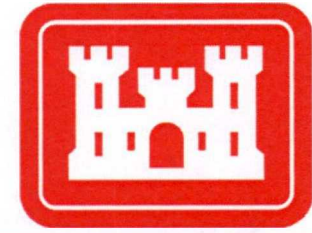


2002





# PA - Source Identification



## Visit identified areas

- Ground truthing
  - Current conditions
  - Surface type identification (concrete, asphalt, natural, etc.)
  - Likely runoff/drainage patterns
  - Existing surface disturbances and extents

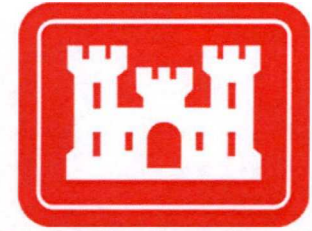






# ***PA - Source Identification***

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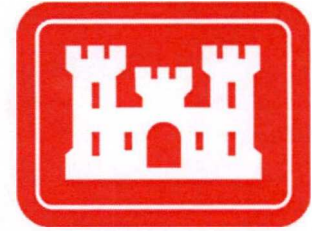


## **Critical Needs**

- Contact information for Interviewees
- Historical resource contact information
- JBLM staff input



# ***PA - Source Identification***

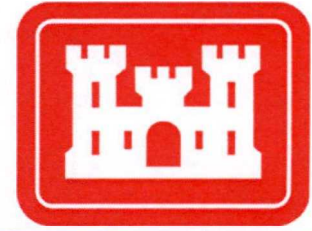


## **Other Important Considerations**

- Surface water pathway could be very important
  - Surface water sampling may be appropriate
- Other compounds can interfere with PFAS analysis
  - ppm or ppb levels could impact the parts per trillion requirement for PFAS compounds
  - Could impact lab instrumentation performance
  - Need to identify this condition to the laboratory, if present, and the lab may need to dilute samples.
  - This will require additional sample volume.
- Municipal and installation storm water to dry wells could be multiple low level sources.
- Identify old training or accident locations with concrete surfaces. Concrete can be a secondary source if PFAS's have impregnated the concrete



# ***PA - Source Identification***



## **Potential Source Area Prioritization Criteria**

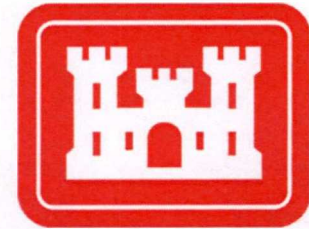
1. Historical/anecdotal information for considerable AFFF application volumes
2. Proximity to impacted production wells
3. Areas with most direct pathway to impacted production wells







# Analyte List



## Current Scope – Unregulated Contaminant Monitoring Rule (UCMR) List (6 analytes)

- Perfluorooctanesulfonic Acid (PFOS)
- Perfluorooctanoic Acid (PFOA)
- Perfluorobutanesulfonic Acid (PFBS)
- Perfluoroheptanoic Acid (PFHpA)
- Perfluorohexanesulfonic Acid (PFHxS)
- Perfluorononanoic Acid (PFNA)

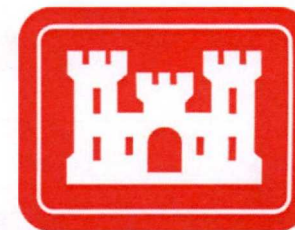


**Public Meeting and Webinar:**  
The Fourth Unregulated Contaminant  
Monitoring Rule (UCMR 4)  
Meeting Presentations

Held April 12, 2017  
USEPA, Office of Ground Water and Drinking Water



# Analyte List



## Method 537 List (14 analytes)

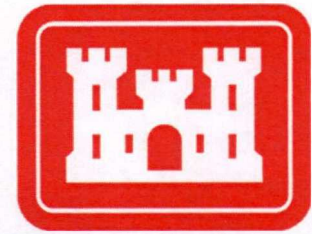
- N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)
- N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
- Perfluorobutanesulfonic acid (PFBS)\*
- Perfluorodecanoic acid (PFDA)
- Perfluorododecanoic acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)\*
- Perfluorohexanesulfonic acid (PFHxS)\*
- Perfluorohexanoic acid (PFHxA)
- Perfluorononanoic acid (PFNA)\*
- Perfluorooctanesulfonic acid (PFOS)\*
- Perfluorooctanoic acid (PFOA)\*
- Perfluorotetradecanoic acid (PFTA)
- Perfluorotridecanoic acid (PFTrDA)
- Perfluoroundecanoic acid (PFUnA)

\* UCMR analytes





# *Analyte List*

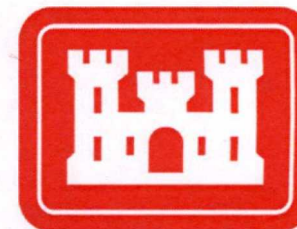


**The type(s) of AFFF used (3M vs Ansul) is strong consideration.**

- The 3M product is primarily PFOS
  - Current analyte scope will likely be sufficient for source identification
- Ansul is primarily precursors to PFOS/PFOA
  - Most of the compounds will be missed with just the UCMR 6 compounds.



# Analyte List



**EPA in the process of identifying 24 PFAS compounds which will need to be quantified. Publication was intended for November 2017.**

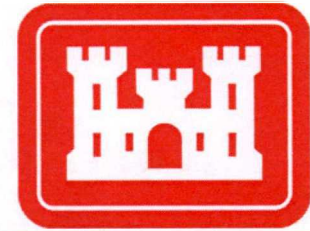
These analytes are:

- Perfluorobutanoic acid (PFBA)
- Perfluoropentanoic acid (PFPeA)
- Perfluorohexanoic acid (PFHxA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorooctanoic acid (PFOA)
- Perfluorononanoic acid (PFNA)
- Perfluorodecanoic acid (PFDA)
- Perfluoroundecanoic acid (PFUnA)
- Perfluorododecanoic acid (PFDoA)
- Perfluorotridecanoic Acid (PFTriA)
- Perfluorotetradecanoic acid (PFTeA)
- Perfluorobutanesulfonic acid (PFBS)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluoroheptanesulfonic Acid (PFHpS)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluorodecanesulfonic acid (PFDS)
- Perfluorooctane Sulfonamide (FOSA)
- N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)
- N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)
- Perfluoro-1-pentanesulfonate (PFPeS)
- Perfluoro-1-nonanesulfonate (PFNS)
- 6:2FTS
- 8:2FTS
- 4:2FTS





# *Analyte List*



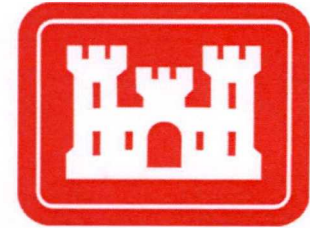
**Since PFOS/PFOA have been detected in production well samples, the UCMR 6 compound list should be adequate to identify potential source areas for this PA/SI.**

**The presence of PFOS and PFOA in water samples also suggests that 3M manufactured AFFF was likely used at the installations.**

- Perfluorooctanesulfonic Acid (PFOS)
- Perfluorooctanic Acid (PFOA)
- Perfluorobutanesulfonic Acid (PFBS)
- Perfluoroheptanoic Acid (PFHpA)
- Perfluorohexanesulfonic Acid (PFHxS)
- Perfluorononanoic Acid (PFNA)



# Existing Data Review



## Existing PFAS Data Summary

- Six production wells currently have PFAS concentrations above the EPA Lifetime Health Advisory concentration of 70 parts per trillion (ppt), range is 70 to 251 ppt.
  - McChord North Well
  - McChord South Well
  - PB Replacement Well I
  - *McChord Field* Lewis Housing Well II
  - Lewis Well 17
  - Lewis Well 22
- Three production wells currently have PFAS concentrations between 30 and 70 ppt
  - McChord East Well
  - Lewis Well 14
  - Lewis Mars Hill Well
- Remaining production wells are less than 30 ppt
- Highest concentrations are on McChord, west of runway, northeastern and western portions of Lewis.





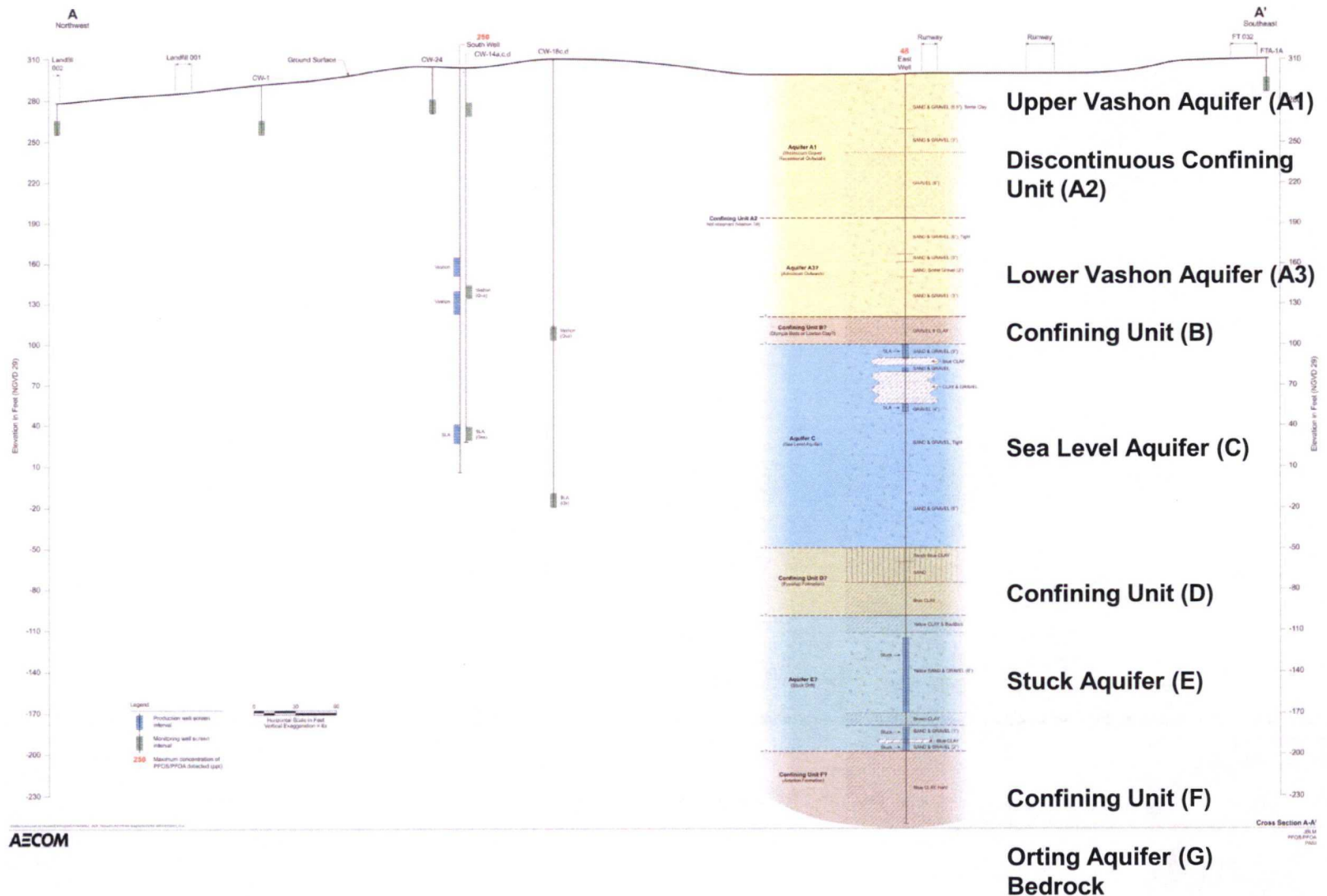
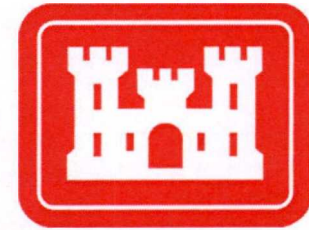






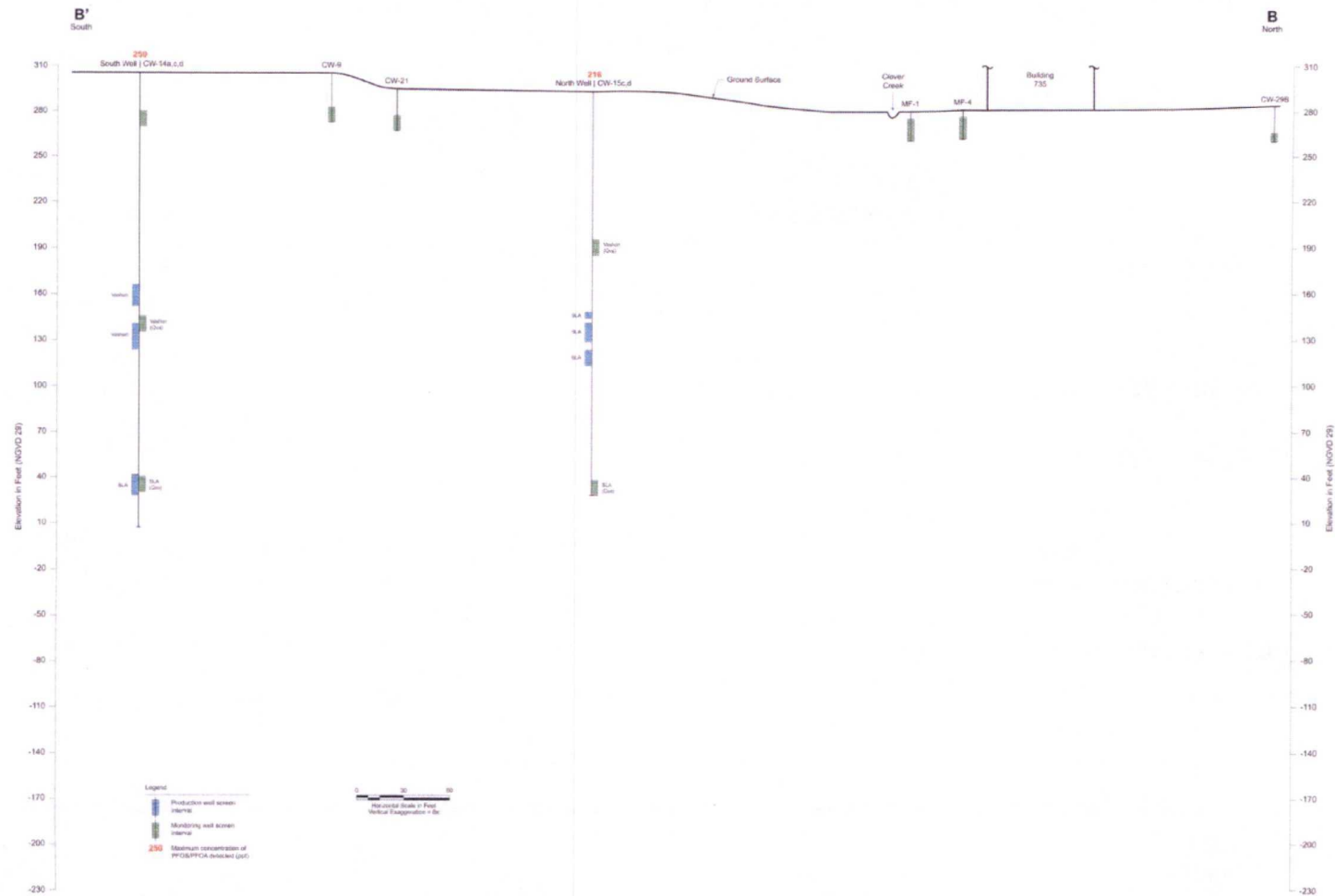
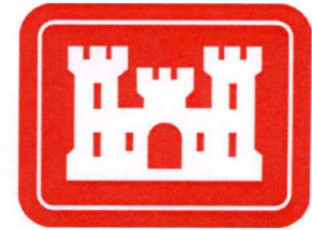


# Site Geology/Hydrogeology





# Site Geology/Hydrogeology



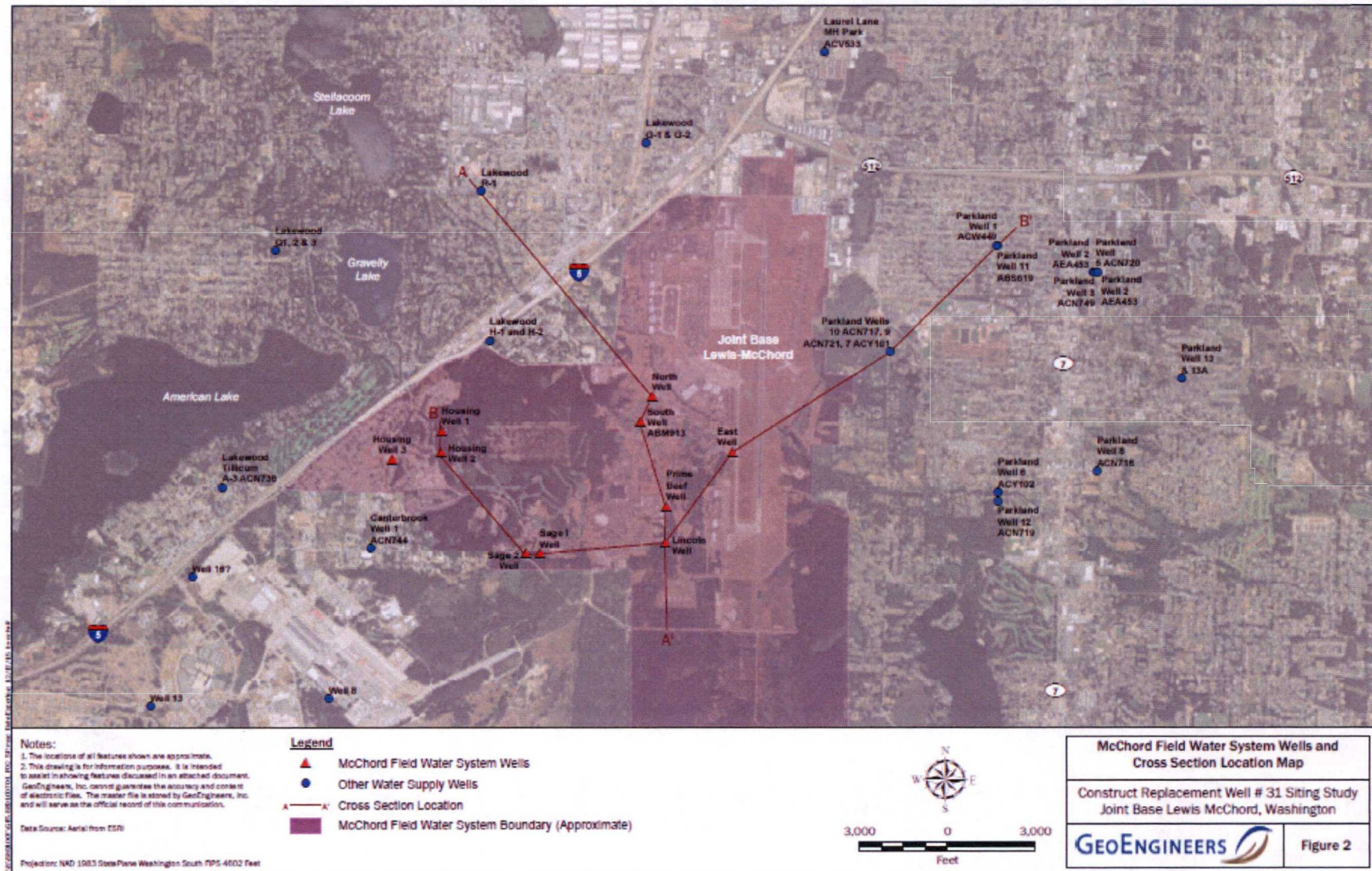
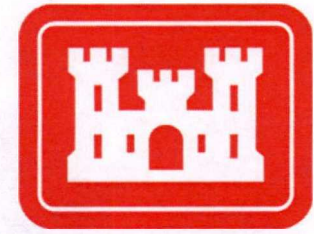
AECOM

Cross Section B-B'  
JBLM  
1/10/2010  
mst





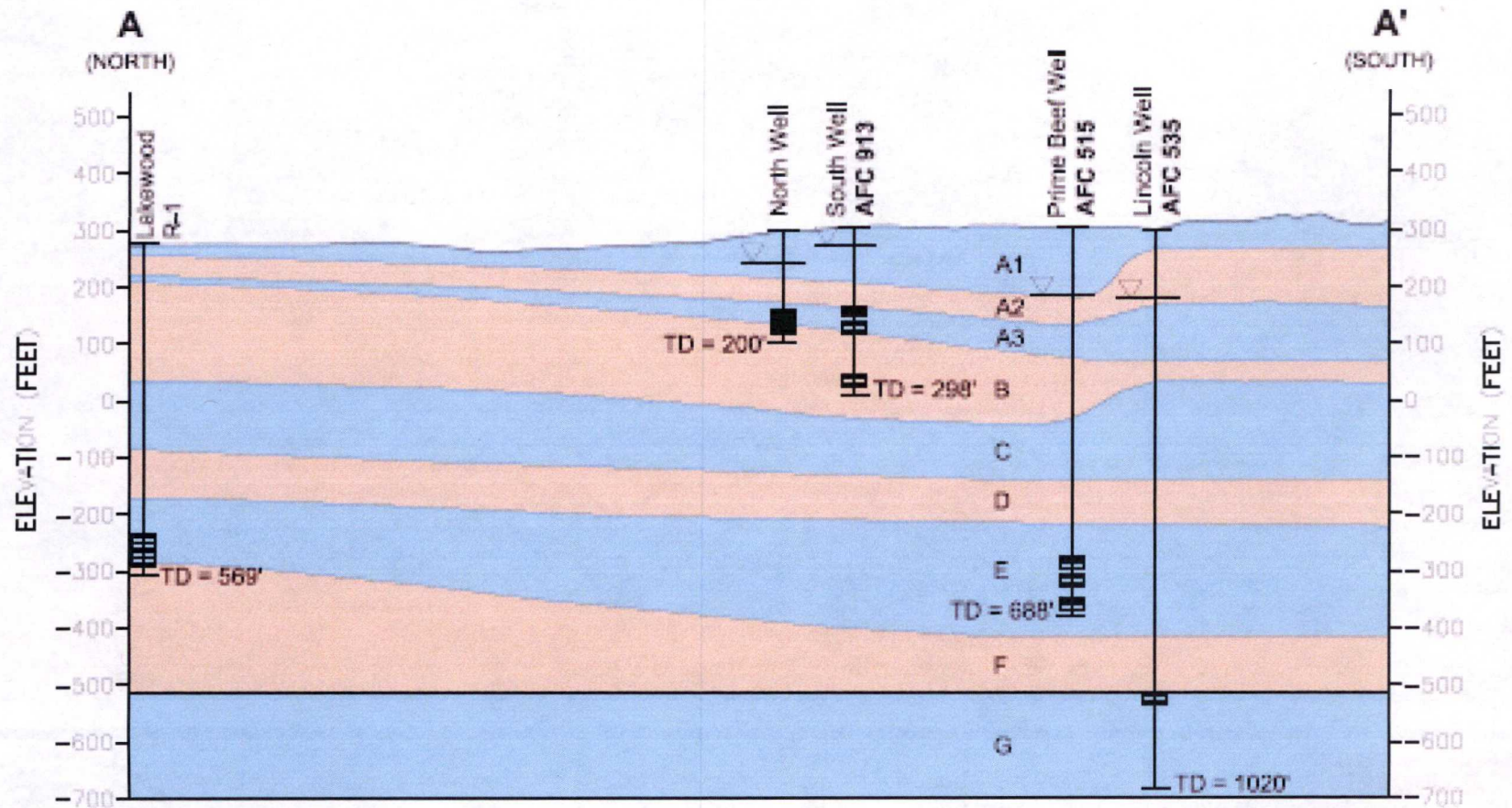
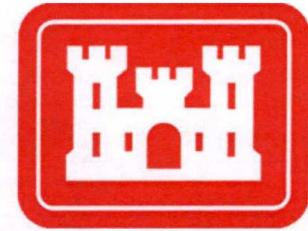
# Site Geology/Hydrogeology







# Site Geology/Hydrogeology

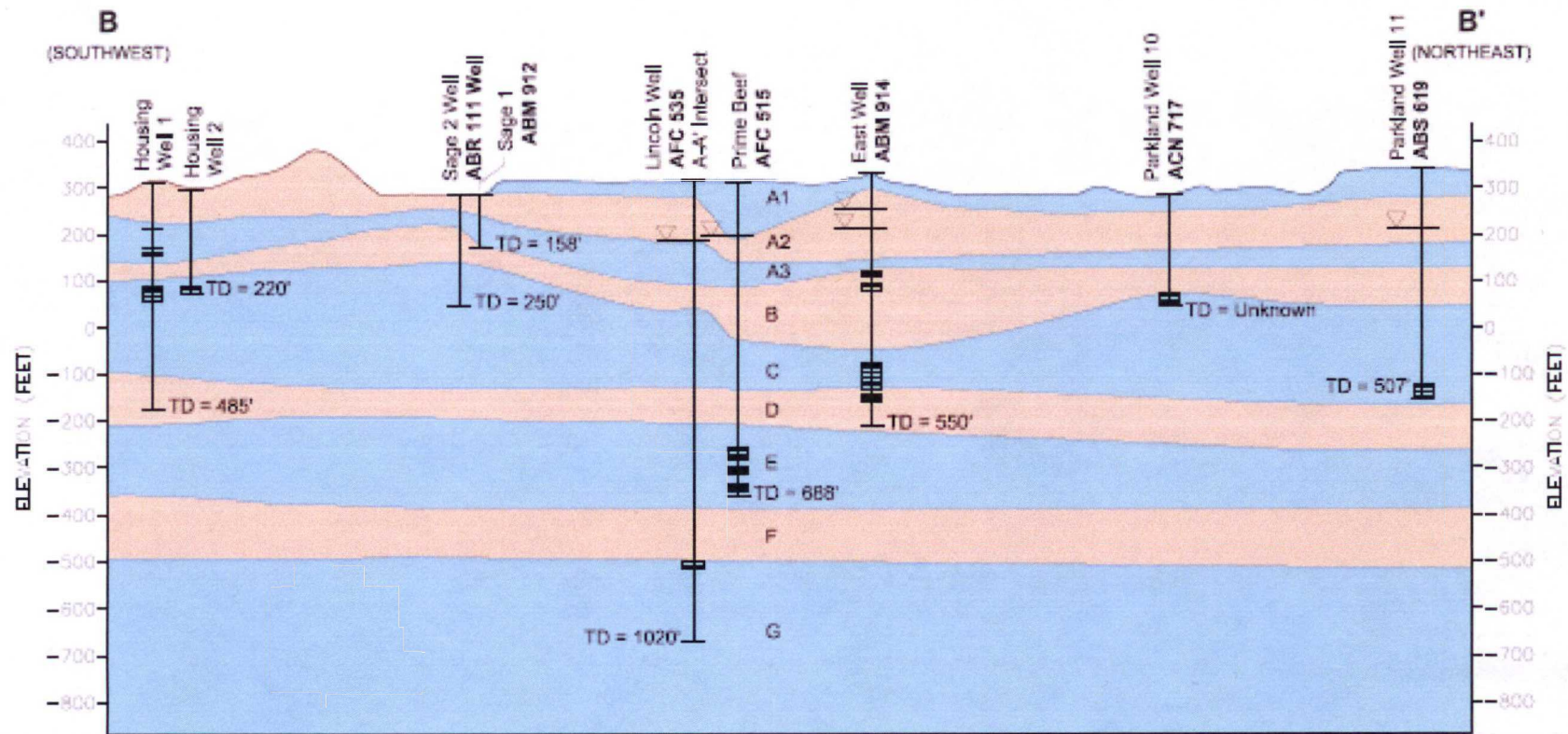
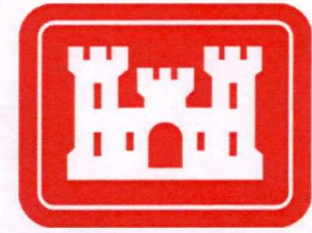


From GeoEngineers 2015





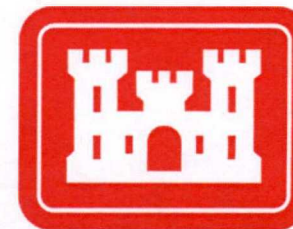
# Site Geology/Hydrogeology



From GeoEngineers 2015



# Site Geology/Hydrogeology



28 Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Chambers-Clover Creek Watershed, Washington

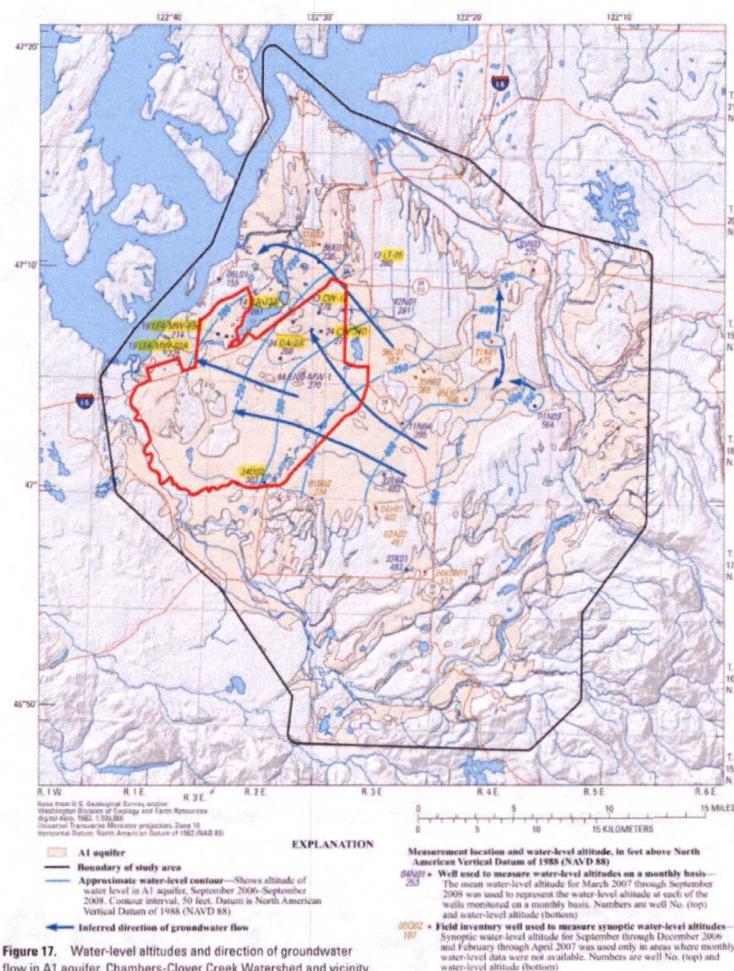
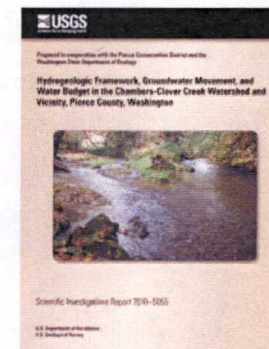


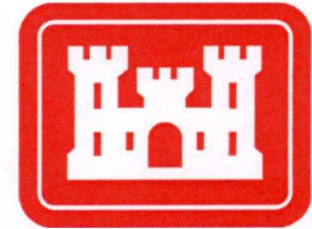
Figure 17. Water-level altitudes and direction of groundwater flow in A1 aquifer, Chambers-Clover Creek Watershed and vicinity, Washington, September 2006–September 2008.







# Site Geology/Hydrogeology



Groundwater Movement 29

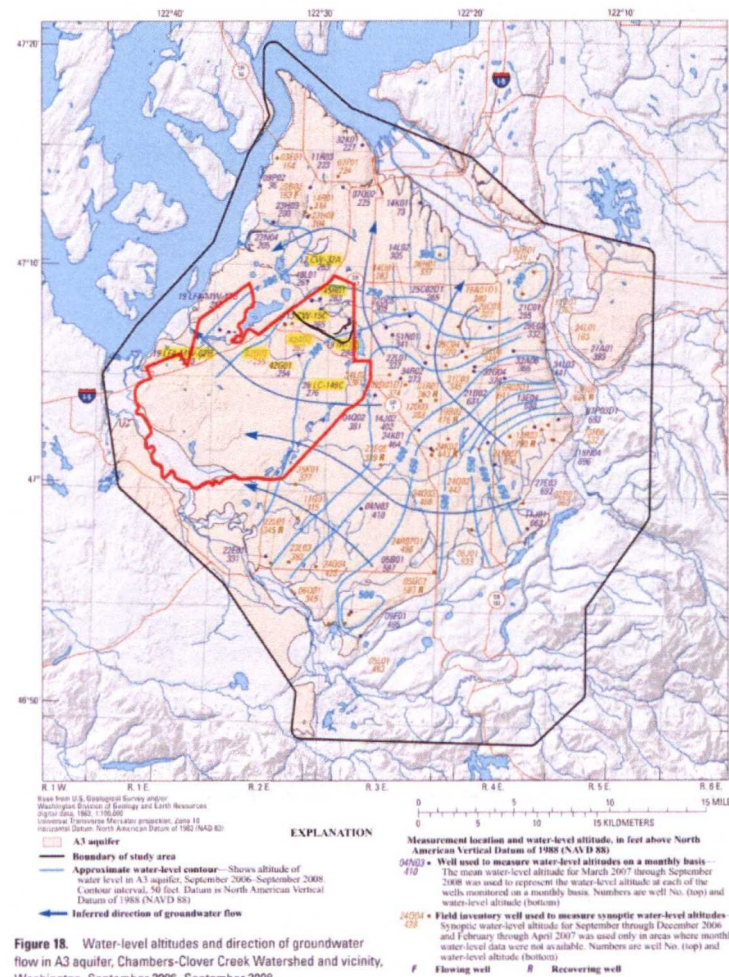
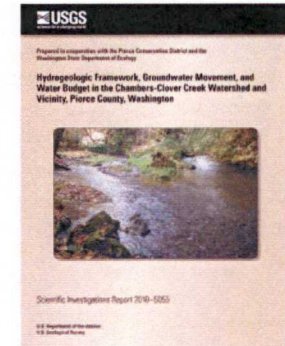
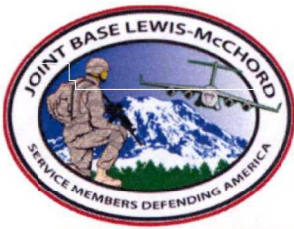
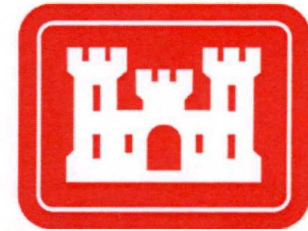


Figure 18. Water-level altitudes and direction of groundwater flow in A3 aquifer, Chambers-Clover Creek Watershed and vicinity, Washington, September 2006–September 2008.

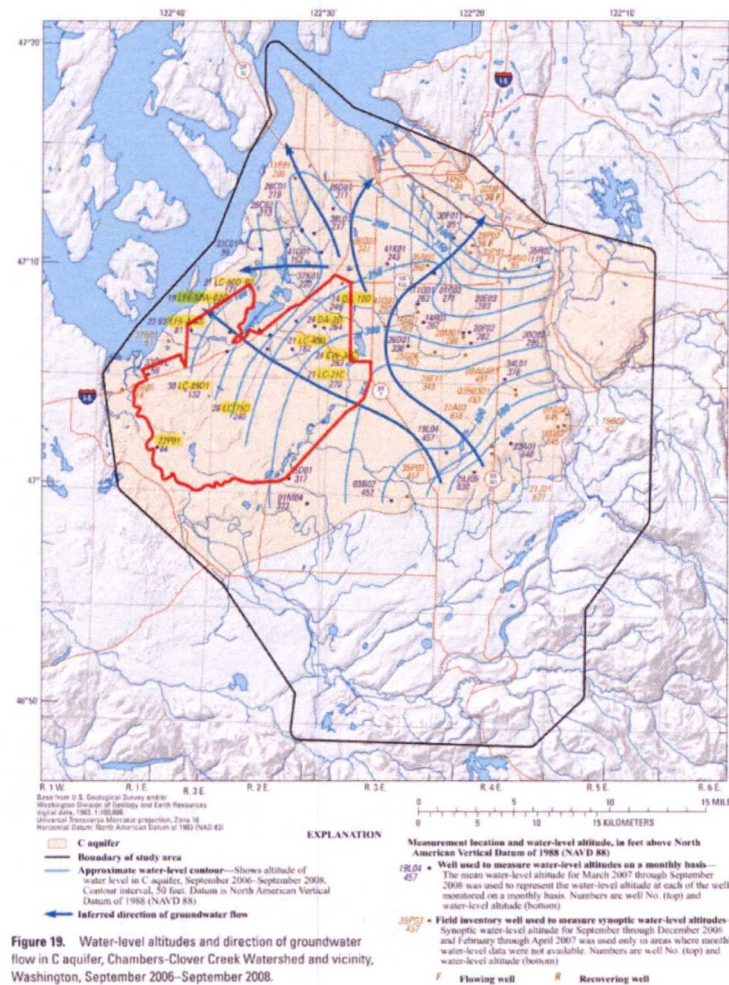




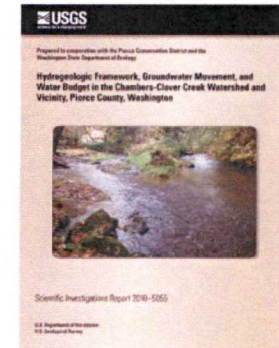
# Site Geology/Hydrogeology



## 30 Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Chambers-Clover Creek Watershed, Washington



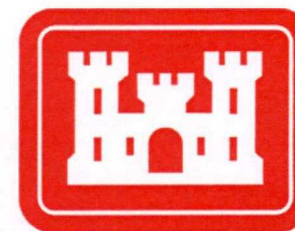
**Figure 19.** Water-level altitudes and direction of groundwater flow in C aquifer, Chambers-Clover Creek Watershed and vicinity, Washington, September 2006–September 2008.



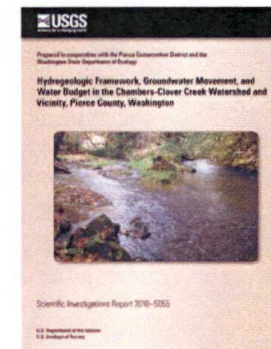
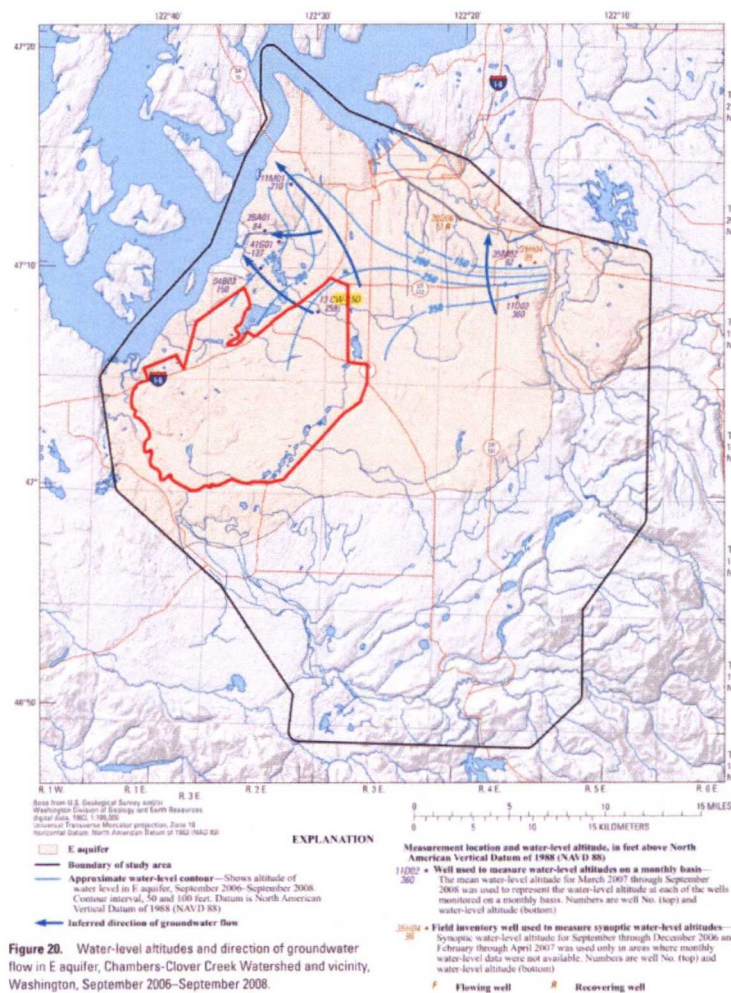




# Site Geology/Hydrogeology

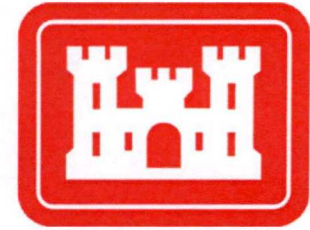


Groundwater Movement 31





# Site Geology/Hydrogeology



32 Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Chambers-Clover Creek Watershed, Washington

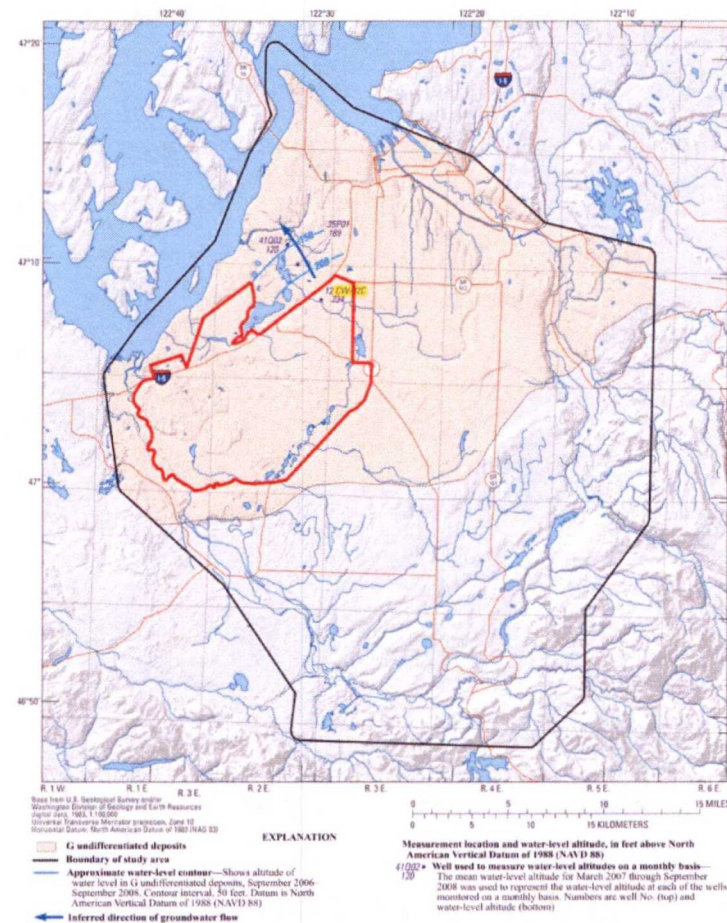
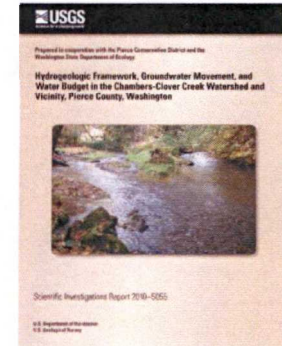


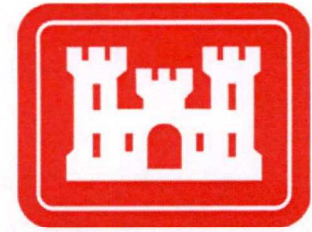
Figure 21. Water-level altitudes and direction of groundwater flow in G undifferentiated deposits, Chambers-Clover Creek Watershed and vicinity, Washington, September 2006–September 2008.







# *Data Gaps*



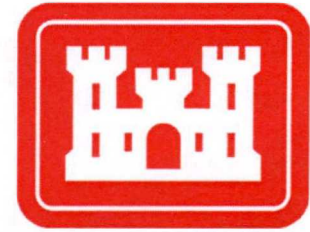
## Limited Lithologic Information

- Source areas and strength
- Limited lithologic information on production and deep monitoring well boring logs
- Limited number of deep monitoring wells
- Production wells screened within multiple water bearing units



# ***Potential Existing Well Sampling Locations***

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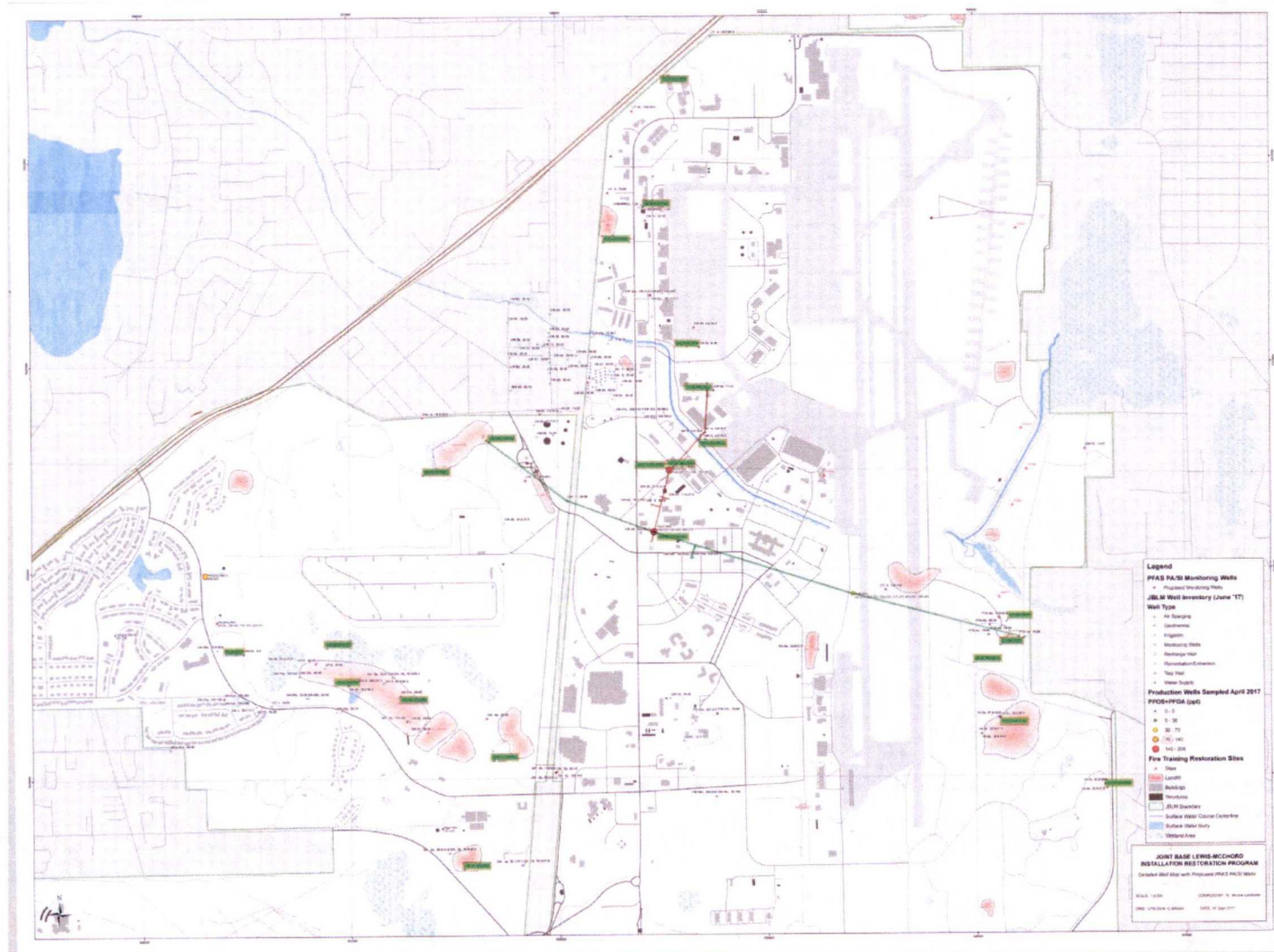
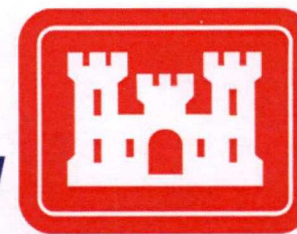
## **Selection criteria**

- Shallow horizontal coverage for Phase I
- Add vertical coverage in the highest concentration areas, where available, for Phase II
- 60 total groundwater samples for two events scoped, 15 reserved from new wells (if installed)
- 50 total optional samples with 15 reserved for optional new additional wells (if installed)





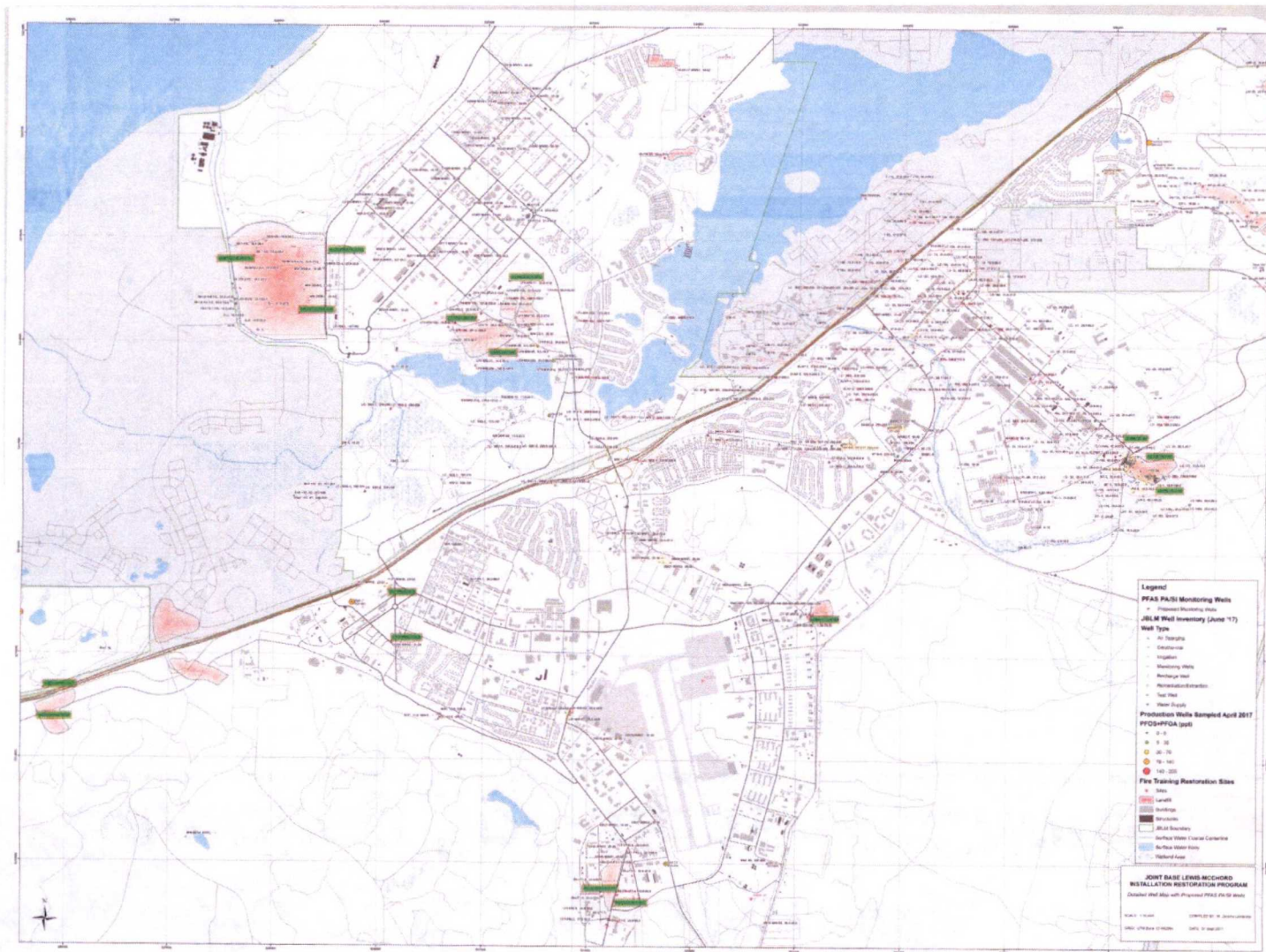
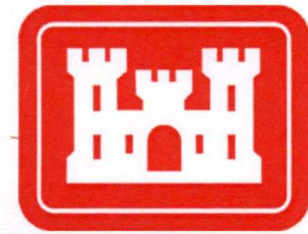
# Potential Existing Well Sampling Locations-McChord







# Potential Existing Well Sampling Locations-Lewis

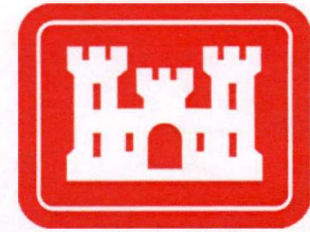






# ***Current Schedule***

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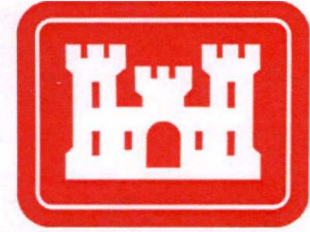


- Mid-December 2017 to end of January 2018 - PA research and field visits
- Mid-January 2018 - TPP #2 to finalize Phase I sampling location selection
- February 2018 - Draft PA and QAPP for project team review delivered after TPP #2
- March 2018 - TPP #3 QAPP Comment Resolution and QAPP Finalization
- April 2018 - Commence Phase I Sampling
- July 2018 - TPP #4, review Phase I data, select additional drilling and sampling locations, QAPP Addendum
- August 2018 - Additional Well Installation (if needed) and Phase II sampling
- October 2018 - Draft SI Report



# *Approach Adjustments?*

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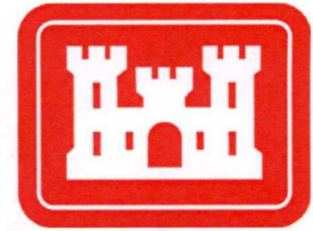
1. Review existing data
2. Potential PFOS/PFOA source identification/assessment
3. Prioritize source areas
4. TPP #2 – to select Phase I sampling locations
  - Existing wells
  - OU 1 LF-2 P&T System
  - OU 1 I-5 P&T System
  - OU 1 Sea Level Aquifer P&T System
  - OU3 ALGT source area wells
5. Finalize list for Phase I sample collection and analysis
6. QAPP review and finalization
7. Conduct Phase I sampling
8. Conduct lab analysis





# *Approach Adjustments?*

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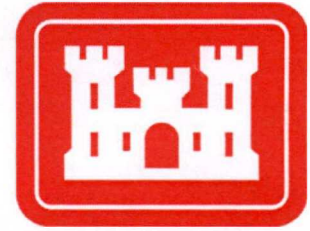


9. TPP #3
  - Review tabular summary of Phase I (tables and maps)
  - Identify supplemental well installation locations
10. QAPP Addendum #1 – Well Installation and Phase II sampling locations (tables and maps)
11. Install supplemental wells
12. Identify monitoring wells for Phase II sample collection and analysis
13. Conduct sample collection and analysis
14. TPP #4 – Review tabular summary of results
15. Report all results with project team review prior to finalization



# *Path Forward*

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## **Open Discussion**